# FDRPAS

CONCEPTS & FACILITIES GUIDE

INNOVATION® DATA PROCESSING

# FDRPAS

t a b l e  o f  c o n t e n t s

# INTRODUCTION

## CONCEPTS & FACILITIES GUIDES

For more than 30 years, Innovation Data Processing has been producing high-quality Storage Management Software. Over the years, its products have evolved into today's ultra high-speed, safe, reliable storage management solutions for OS/390, z/OS, LAN and Open Systems Data.

It all started with the **FDR Storage Management Family**, of which over 5000 licenses have now been sold worldwide. The FDR Family is the complete Storage Management System for OS/390 and z/OS.

**FDR** has become the industry standard for fast, reliable backups of MVS OS/390 data.

**ABR** adds a layer of automation to the standard functions of FDR, providing advanced backup facilities like *Incremental Backup*, *Application Backup* and *Archiving*.

**COMPAKTOR** and **FDRREORG** further enhance the suite by adding intelligent and powerful reorganization processes, for whole DASD volumes and for Sequential, PDS and VSAM datasets.

**FDREPORT** provides extensive customized DASD Management Reporting to suit many needs and purposes.

**FDRCLONE** is an extension to ABR, providing the ability to "clone" volumes and/or datasets on a test or disaster recovery system. It includes **FDRDRP**, a utility that can reduce ABR full-volume recovery time by up to 80%.

**FDRINSTANT** enables FDR/ABR to take *non-disruptive backups* of offline volumes, created by the latest DASD Subsystem features like StorageTek/IBM SnapShot Copy, EMC$^2$ TimeFinder/BCV, HDS ShadowImage and IBM FlashCopy.

**FDRPAS** (FDR Plug and Swap) allows for the non-disruptive movement of OS/390 disk volumes from one disk device to another. When new disk subsystems are installed, active online disk volumes can be swapped to drives in the new subsystem without disrupting normal operations or requiring a re-IPL. This allows a 24 x 7 installation, with no window for major re-configurations and hardware changes, to install and activate new hardware.

**THE FDR/UPSTREAM Family of Products** builds on the strengths of the FDR Storage Management Family providing a fast, safe and reliable solution to backing up Open Systems data from file servers and workstations, across a network connection to disk or tape on the OS/390 host. If the Open Systems data is resident on an EMC$^2$ Symmetrix with Enterprise Storage Platform (ESP), **FDRSOS** and **FDR/UPSTREAM/SOS** products provide additional performance enhancements to the backup and restore process by utilizing high-speed mainframe channels.

**IAM** is Innovation's alternative to VSAM KSDS, ESDS and (as a cost option) AIX files. It eliminates VSAM performance bottlenecks and reduces VSAM file sizes by more than 50%.

**FATS/FATAR** and **FATSCOPY** are a set of multi-purpose tape subsystem Media Integrity tools that allow for online tape certification, verification and erasure, as well as the ability to analyze and copy tapes.

# INTRODUCTION

## CONCEPTS & FACILITIES GUIDES

Each of the Innovation products are described in a range of Concepts & Facilities Guides that have been created by the Innovation UK office, but which are available *free of charge* from your local office (see back cover for details).

In this particular guide, we look at **FDRPAS** and its ability to non-disruptively move OS/390 and z/OS DASD volumes from one disk device to another.

FDRPAS is a separately licensed component of the FDR Family.

*(Note: FDRPAS is also available from IBM Global Services and from some IBM Channel Partners)*

*Any comments or suggestions regarding this guide can be directed to:*
***support@fdrinnovation.com***

# INTRODUCING

## FDRPAS

### FDRPAS—Non-Disruptive Movement of Disk Volumes

FDRPAS is the latest addition to the FDR Storage Management Family. It is available as a cost option and it provides the ability to perform ***non-disruptive movement*** of z/OS and OS/390 disk volumes from one disk device to another, of a similar device type.

FDRPAS can swap volumes that are ***active***. Users and application programs can continue to safely allocate new datasets on the volume(s) being moved, and they can also read, update and even delete existing datasets as well, without any disruption to their own processing or to the FDRPAS swap process.

FDRPAS can move volumes within a single system image, or volumes attached to multiple systems or LPARs in a shared-DASD complex or sysplex, whether locally or remotely attached. Multiple volumes can be swapped concurrently.

FDRPAS supports a wide variety of disk devices from hardware vendors including IBM, EMC, StorageTek, Amdahl and Hitachi. It can swap disk volumes between disks of the same type from the same hardware vendor, or between disks supplied by different vendors.

In general, no special software or hardware modifications are required to run FDRPAS. However, please see the note at the bottom of Page 16 regarding the FDRPAS website, which contains details on microcode requirements and up-to-date PTF information.

As well as DASD volumes containing standard application data, FDRPAS can also swap the following types of volumes:

- The SYSRES (and other active “system” volumes)
- Volumes with open catalogs
- Volumes containing multi-volume datasets
- CICS, TSO, Database volumes
- SMS-Managed volumes and WORK volumes

FDRPAS can even swap a smaller device to a larger device of the same type (*e.g.* 3390-3 to 3390-9), automatically updating the VTOC and Indexed VTOC on all sharing systems. The only volumes that FDRPAS *cannot* move are those containing active local PAGE or SWAP datasets, as described in the “Special Considerations” section (section 320) of the product manual.

### FDRPAS—24 x 7 x 52 Availability

The demand for 24 x 7 availability has never been greater. System outages due to the implementation of new DASD hardware can no longer be tolerated. This problem is addressed by FDRPAS, which can move/migrate *hundreds* of volumes in a day.

By default, FDRPAS copies 15 tracks from the source to the target in each I/O. An FDRPAS SWAP will take about the same elapsed time as a normal full-volume disk-to-disk copy, unless there is a great deal of update activity on the volume being swapped.

The average elapsed time for FDRPAS to copy a 3390-3 is just 6 to 12 minutes! This volume movement can be done during normal system operations, without interrupting other activity. The operating system, application jobs, online systems, and end-users are unaware that FDRPAS is swapping disks to new devices.

# FDRPAS

## FDRPAS—Performance and Efficiency

As well as working non-disruptively, the FDRPAS SWAP process is also highly efficient. The SWAP is accomplished with minimal impact on the performance of applications using the volume(s) being swapped. As already mentioned, end-users and applications can continue to use the volume(s), unaware that the data movement is occurring or has completed.

FDRPAS will dynamically manage the copy process in response to system activity (*e.g.* copying inactive datasets before active datasets and, optionally, pacing the copy I/O), to minimize its effect on the system. If necessary, SWAPs can also be suspended and then resumed at a later time.

## FDRPAS—Ease-Of-Use

One of the key features of FDRPAS is its ease-of-use. The initiation of a volume swap can be done with a simple batch job, or through a set of ISPF panels (see “Initiating FDRPAS Swaps” later in this document). The SWAP process can be monitored as it progresses, and a History record of all previous SWAPs can be viewed at any time.

Let’s take a look now at five different ways that the FDRPAS SWAP process can be usefully employed within the day-to-day operations of a Data Center.

## FDRPAS—Benefits

**1. Installing New DASD Hardware**

One of FDRPAS’s primary uses is with the installation of new DASD hardware.

With current OS/390 and z/OS hardware and software, you can now attach new disk subsystems and dynamically activate an updated I/O configuration to make these subsystems immediately available. This allows you to get the new hardware installed and operational as quickly as possible, without having to carry out an IPL of the Operating System.

However, with your new DASD hardware in place, you then need a way to quickly and easily move your data from the old volumes across to the new. You could use standard volume dump/restores with FDR or ABR, but this would require a quiesce of activity on the volume(s) to be moved (for the duration of the whole move) to ensure that data is in a consistent state.

***FDRPAS Solution***

***FDRPAS*** *offers a far better solution. It allows you to move the data from existing DASD volumes to the new hardware while those volumes are still in use.*

*When* ***FDRPAS*** *completes the SWAP process, the data resides completely on the new volume and the original volume is no longer required.*

*(See later for a full description of the SWAP process).*

## FDRPAS

**2. General Data Movement**

Aside from installing new hardware, data centers may also have a requirement to move data around from time-to-time, either within a single DASD subsystem, or across multiple subsystems.

For data centers running 24 x 7 operations, and perhaps even installations with large maintenance windows, there simply isn't sufficient "off peak" time available to move what is often now terabytes of data.

***FDRPAS Solution***

***FDRPAS*** *removes this problem by allowing you to non-disruptively move terabytes of data during normal business hours.*

**3. An Alternative To Movement By Volume-Level Dump/Restore**

Until now we have talked about moving large numbers of DASD volumes around. But in most data centers a need often arises to move a single DASD volume across to another device, perhaps of a different capacity (*e.g.* 3390-3 to a larger device, like a 3390-9).

If the volume to be moved is inactive, this data movement can easily be done with a dump and restore process using FDR or ABR. But if the volume is active, or if it contains open catalogs, the process is more complicated.

***FDRPAS Solution***

***FDRPAS*** *can move an active volume without having to wait for all activity to be quiesced, or for open catalogs to be closed.*

**4. I/O Load Balancing**

Occasionally, the I/O load in one or more disk subsystems may be excessive, while other subsystems remain under utilized.

***FDRPAS Solution***

***FDRPAS*** *can be used to rearrange disk volumes to distribute the I/O load and improve performance. This work can be done as soon as it is required—day or night.*

**5. Non-Disruptive backup**

As described in our *"Corporate Backup with FDRINSTANT"* white paper, today's 24 x 7 data centers now need to take their daily backups *without* suffering a backup window running into several hours.

***FDRPAS Solution***

***FDRPAS*** *can be used to create offline point-in-time copies of DASD volumes, which can be used by FDR in conjunction with FDRINSTANT to take 'instant' backups.*

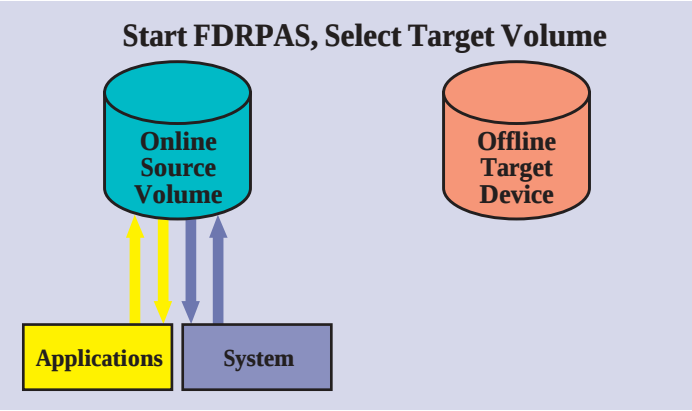
# FDRPAS

## The Basic SWAP Process (Single System Environment)

Let's take a look at the basic SWAP process employed by FDRPAS in a "single system" environment—*i.e.* where the volume to be swapped is only accessed by applications running in a single MVS image.

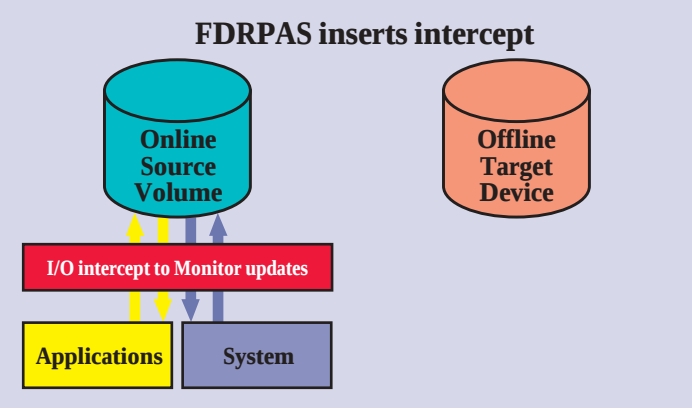
First, a SWAP task is initiated (through a Batch Job, a Proc, an Operator Command, or with the ISPF panels—see later).

The SWAP task identifies the online "Source" volume to be swapped and the offline "Target" address where the data will be moved to. Our diagram shows one volume being swapped, but up to 32 can be swapped in one FDRPAS job (you can run more jobs if more SWAPs are required).



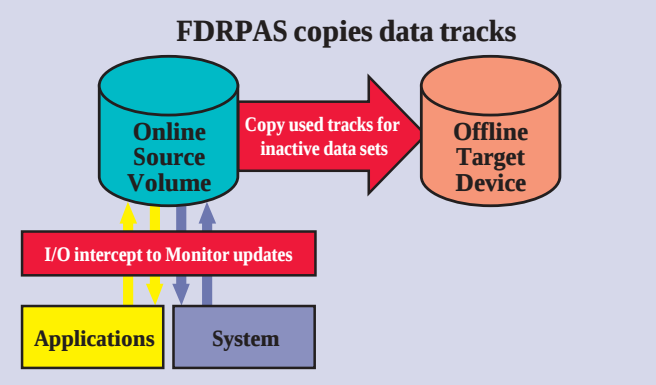

FDRPAS then temporarily suspends I/O to the online Source volume while it inserts an 'intercept' to record the updates that are occurring, be it from end-user applications or from MVS system processes.

Once the intercept is in place, I/O to the source volume can be resumed.

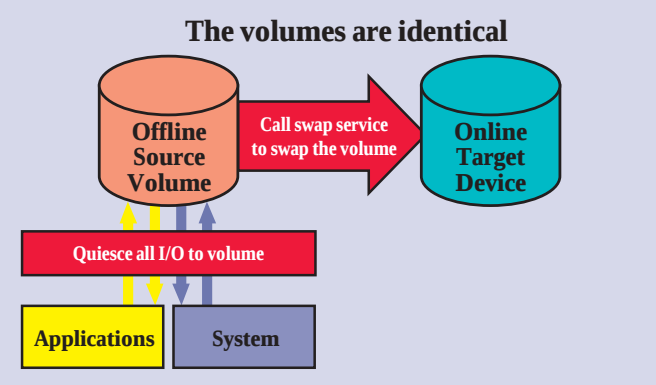


## FDRPAS

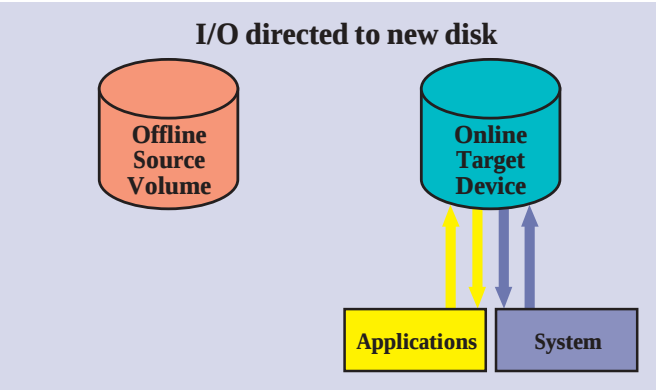
FDRPAS then starts copying the data from the Source to the offline Target volume. The Target remains *offline* for the duration of the copy process so that the data copied to it is protected until the SWAP is complete. All used tracks (for inactive datsets) and all allocated tracks (for active datasets) are copied, while FDRPAS simultaneously detects updates to the Source. Updated tracks are then re-copied if necessary.




At the end of the SWAP process, the Source and Target volumes are identical. All I/O activity to the Source is then quiesced momentarily while access is swapped across to the Target volume:




FDRPAS switches devices so that all I/O is directed to the new device. During this process, the new device is placed online, while the old device is varied offline and the label is modified so that MVS will no longer be able to vary it online (unless a RESTVOL is run). When the MVS system is re-IPLed, it will be the *new* device that automatically comes online.



# FDRPAS

## FDRPAS SWAP Process—Details

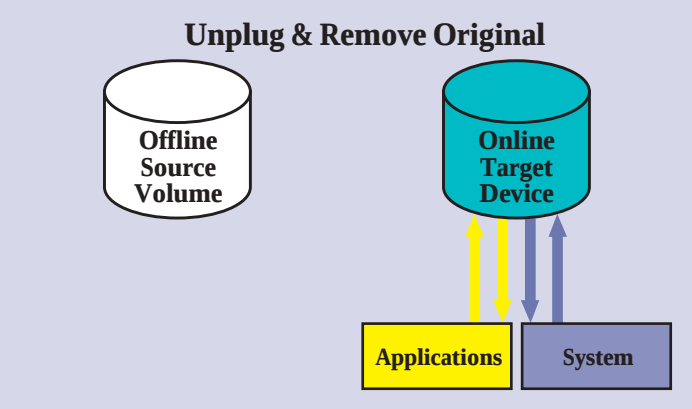
Some key points to note about the FDRPAS SWAP process:

- Only the Source and Target devices are accessed during the FDRPAS SWAP process. No other volumes need to be accessed by FDRPAS, with the exception of a dynamic allocation to the SYSRES volume during the SWAP process.
- FDRPAS does *not* use any additional communication service, such as TCP/IP or VTAM.
- FDRPAS does *not* require a coupling facility, or a separate 'control' dataset on a third disk volume.
- An FDRPAS copy process can be terminated at any time before the final SWAP has completed, without affecting the original device or any applications using it.
- When the SWAP has completed, FDRPAS can, if desired, send an e-mail message to one or more recipients informing them of the successful (or unsuccessful) completion of the task. This feature is enabled via a simple 'FDREMAIL' DD statement in the executing JCL, which points to control statements defining the message content and the intended recipients *(see first example on page 15)*. This feature requires an Internet connection from the LPAR, and also a TCP/IP & SMTP server.

## After the SWAP has completed…

### De-Commissioning The Old Hardware

If new hardware is being installed, the original source volume(s), which is/are now offline, can be unplugged and de-commissioned or reallocated for other uses.




### Point-In-Time Backups

Alternatively, as mentioned earlier, FDRPAS can also be employed in the process of taking non-disruptive, point-in-time backups.

A SWAPDUMP command is used in place of SWAP, which invokes the same COPY process as described above, but at the end of the process, the original Source volume is retained and stays *online,* while the Target volume (now containing a copy of all the data) is maintained in an offline state.

Innovation's FDR and FDRINSTANT products can then be used to backup the offline duplicate. See *"Point-In-Time backups"* later for more details.

## FDRPAS

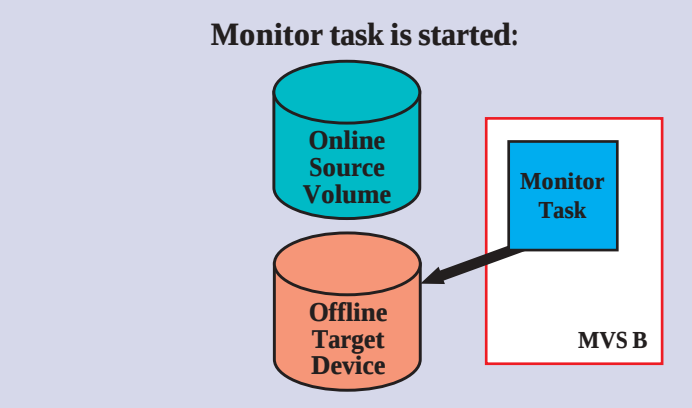
### The Monitor Tasks (Multi-System Environment)

When multiple OS/390 or z/OS systems can access the DASD volume to be moved, there are some additional steps required, as the SWAP process must be co-ordinated on *all* system images. Any update activity during the SWAP must be monitored on all sharing systems, and the final SWAP to the new device must be conducted simultaneously across all images.

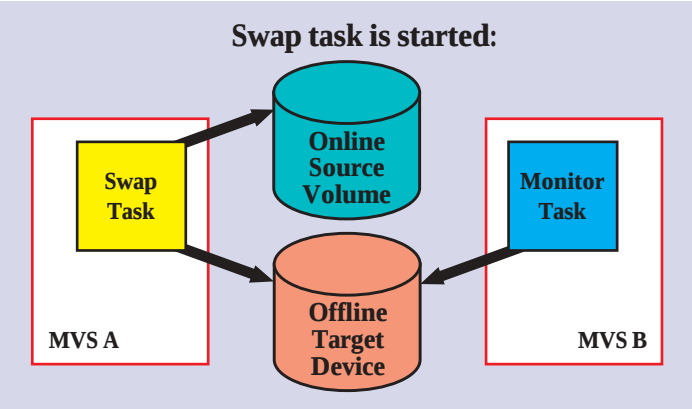
The sequence is as follows:

First, an FDRPAS monitor task is started on all systems that have access to the Target device (even if they don't have access to the Source volume). Each monitor task can monitor up to 64 potential Target devices, after which MVS starts a separate address space for additional monitor tasks.

A disk device can connect to up to 128 systems, so FDRPAS supports up to 128 separate monitor tasks for a given SWAP operation.




An FDRPAS SWAP task is then initiated to specify the Source and Target volumes, as described earlier. The SWAP task can be started in any of the systems involved, but for best performance it should be run on the system with the highest level of update activity to the Source. In our diagram, the monitor task has been started on MVS B, while the SWAP has been initiated on MVS A.



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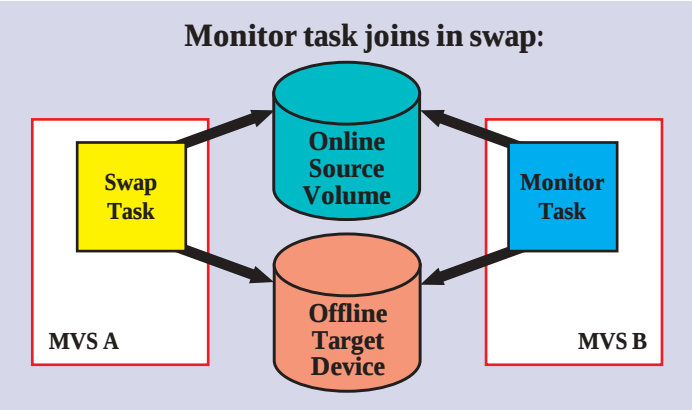
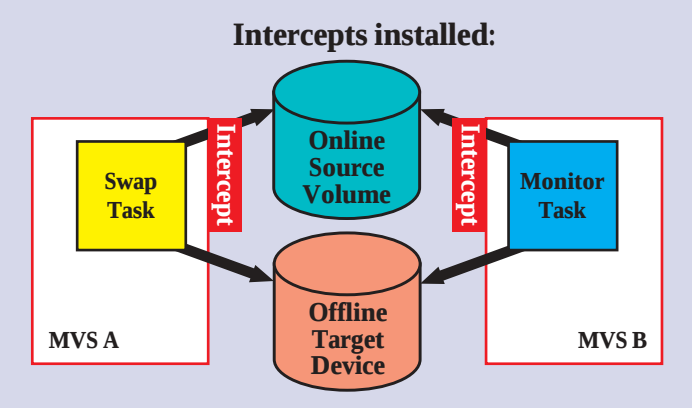
After validating the SWAP request, the FDRPAS SWAP task running in MVS A will indicate that the SWAP is pending.

On all the other system images (in our case, just MVS B), the FDRPAS monitor tasks will recognize the pending SWAP and indicate that they are ready to participate.




When the required number of monitor tasks have acknowledged their participation (see “System Determination” later), the SWAP task will signal that the SWAP has begun. It will then install the I/O intercept on its image to monitor updates.

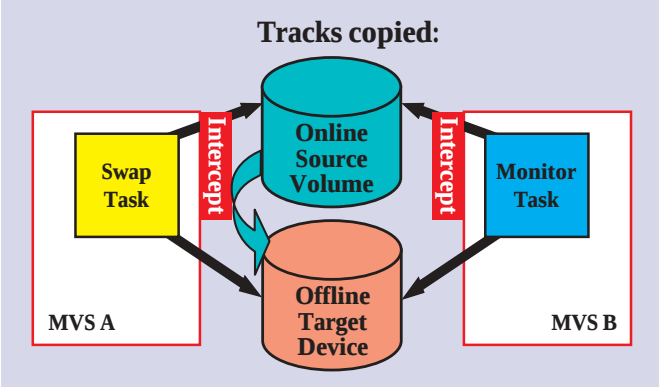
The monitor tasks on the other systems will then recognize that the SWAP has begun and install the I/O intercept on their images to monitor updates.



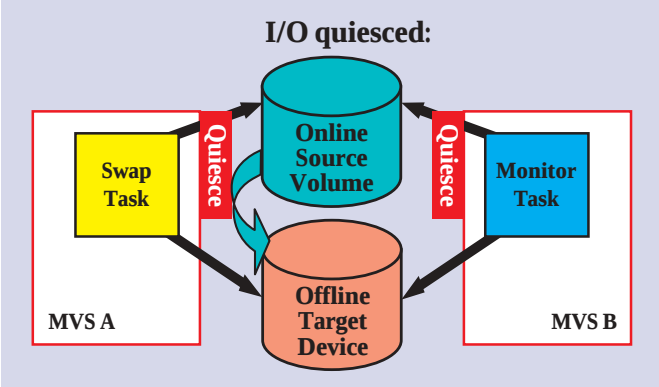

When all monitor tasks have indicated that the intercepts are installed, the SWAP task will begin copying tracks from the original device to the target device, as previously described for the single system SWAPs.

## FDRPAS

The FDRPAS intercepts on each system will monitor all I/O operations to the Source volume and will note all tracks which have been updated. Updated tracks will be copied (or re-copied if necessary) to the Target device.

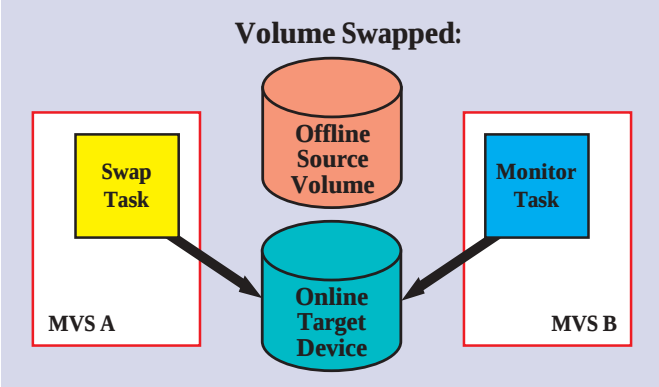



When the copy is complete, FDRPAS signals to all monitor tasks to quiesce I/O to the original device. The remaining tracks, if any, are then copied across to the Target while all other I/O is quiesced.




The SWAP task will then signal all monitor tasks to SWAP all system pointers on all system images so that all future I/O to the volume will be directed to the new device.

As with the single-system SWAP described earlier, the original Source volume will be placed offline and the volume label modified so that it cannot be accidentally brought online during a subsequent Re-IPL.



# FDRPAS

## System Determination

As already stated, in a multi-system environment, one or more FDRPAS monitor tasks must be executed on every system image which has the source volume online; one of those monitor tasks must also monitor the target device if it is in the I/O configuration of that system.

If some of the systems are excluded from the FDRPAS swap process, those systems will not be aware that FDRPAS has moved the volume to a new device, and FDRPAS will not be aware of any updates to the volume which occur on the excluded systems.

To protect against this situation, FDRPAS attempts to determine how many systems have access to the source volume. Depending on the disk hardware involved, FDRPAS may be able to *automatically* identify the number of systems accessing the source volume and then supply the CPU serial number of each of those systems. However, if the number of systems cannot be determined, or if certain systems need to be excluded from participating in the SWAP, *manual* input has to be provided to FDRPAS to control this process. See section 300.05 of the product manual for more detailed information on the recommended procedures for system determination.

## Initiating FDRPAS SWAPs—With Batch Jobs

The initiation of FDRPAS SWAPs is very straightforward. The most common way of starting off a SWAP is with a standard MVS batch job. The following examples show just how simple the process can be. With just a few control statements, hundreds of DASD volumes (containing terabytes of data) can be swapped.

### SINGLE-SYSTEM SWAPs

In the first example, a single DASD volume, accessible by a single system image, will be swapped to a new device. The Source volume (DATA22) **must not** be accessible by any other system image. The Target device (at address 07C3) must be offline. The CHECKTARGET=YES parameter will ensure that the Target device is empty before starting the SWAP operation.

*FDRPAS—Single System SWAP Example #1*

```
//SWAP      EXEC PGM=FDRPAS,REGION=0M
//STEPLIB    DD  DISP=SHR,DSN=fdrpas.loadlib
//SYSPRINT   DD  SYSOUT=*
//SYSUDUMP   DD  SYSOUT=*
//SYSIN      DD  *
    SWAP    TYPE=FULL,CHECKTARGET=YES
    MOUNT   VOL=DATA22,SWAPUNIT=07C3
```

## FDRPAS

In this next example, several volumes on adjacent MVS addresses on a single system image will be swapped to new devices on adjacent addresses (1AA*) in the new disk subsystem. Again, the Source volumes **must not** be accessible by any other system image, and the Target devices must be offline. All three volumes will be swapped concurrently. #SYSTEMS=1 was specified because the source volumes were on a control unit (*e.g.* IBM RVA) where FDRPAS could not determine the number of systems with access to the volume.

*FDRPAS—Single System SWAP Example #2*

```
//SWAP      EXEC PGM=FDRPAS,REGION=0M
//STEPLIB    DD  DISP=SHR,DSN=fdrpas.loadlib
//SYSPRINT   DD  SYSOUT=*
//FDRSUMM    DD  SYSOUT=*
//SYSUDUMP   DD  SYSOUT=*
//SYSIN      DD  *
    SWAP    TYPE=FULL,#SYSTEMS=1,MAXTASKS=3,CHECKTARGET=YES
    MOUNT   VOL=TSO001,SWAPUNIT=1AA*
    MOUNT   VOL=TSO002,SWAPUNIT=1AA*
    MOUNT   VOL=TSO003,SWAPUNIT=1AA*
```

**SIMULATED SWAPs**

The following example executes a *simulated* SWAP (with the SIMSWAP statement) to validate the parameters that will be used for the real SWAP. For multi-system SWAPs (see next page), where FDRPAS can identify the attached systems, SIMSWAP can also display all of the systems that have access to the Source volumes specified.

*FDRPAS—Simulated Swap*

```
//SIMSWAP   EXEC PGM=FDRPAS,REGION=0M
//STEPLIB    DD  DISP=SHR,DSN=fdrpas.loadlib
//SYSPRINT   DD  SYSOUT=*
//SYSUDUMP   DD  SYSOUT=*
    SIMSWAP TYPE=FULL,MAXTASKS=3,CHECKTARGET=YES
    MOUNT   VOL=DATA22,SWAPUNIT=07C3
    MOUNT   VOL=PROD12,SWAPUNIT=425C
    MOUNT   VOL=TSO123,SWAPUNIT=A340
```

## FDRPAS

### MULTI-SYSTEM SWAPs

In this next example, a single volume accessible to *multiple* system images will be swapped to a new device. The volume is in a 3990-6 or 2105 compatible disk subsystem, so FDRPAS will be able to determine the number of systems which have access to the volume. The target device must be offline on all systems. The additional FDREMAIL DD card (which can optionally point to a member in a PDS) allows an e-mail message to be sent after the completion of the SWAP.

*FDRPAS—Multi-System SWAP Example #1*

```
//SWAP     EXEC PGM=FDRPAS,REGION=0M
//STEPLIB   DD  DISP=SHR,DSN=fdrpas.loadlib
//SYSPRINT  DD  SYSOUT=*
//SYSUDUMP  DD  SYSOUT=*
//FDREMAIL  DD  *
MAILSERVER 12.132.14.178
FROM:<abc@mycmpny.com>
TO <xyz@mycompany.com>
SUBJECT: DATA22 SWAP COMPLETED
//SYSIN     DD  *
    SWAP    TYPE=FULL,CHECKTARGET=YES
    MOUNT   VOL=DATA22,SWAPUNIT=07C3
```

Prior to running the above SWAP job, an FDRPAS monitor task must be started on each of the other sharing systems to monitor the offline target device. Below is an example of the monitor job that would be run. FDRPAS will periodically check this device to see if a SWAP task has started on another OS/390 system image which is using the device as a Target. If so, the monitor task will assist the SWAP task by monitoring this system image for updates to the original volume during the copy process, and by switching all I/O activity to the new device when the swap is complete. This type of monitor task will automatically terminate once the swap to the target has completed.

*FDRPAS—Monitor a single volume*

```
//MONITOR   EXEC PASPROC
//SYSIN     DD  *
    MONITOR TYPE=SWAP
    MOUNT   SWAPUNIT=07C3
```

## FDRPAS

And here in an extract of sample output from the above SWAP job. Notice that there were three systems found to be accessing the volume:

```
FDR241 FDRPAS SUCCESSFULLY COMPLETED SWAP OF VOL=DATA22 TO UNIT=07C3 ON CPUB 16.31.54
FDR241 FDRPAS SUCCESSFULLY COMPLETED SWAP OF VOL=DATA22 TO UNIT=07C3 ON CPUA 16.31.56
FDR241 FDRPAS SUCCESSFULLY COMPLETED SWAP OF VOL=DATA22 TO UNIT=07C3 ON CPUC 16.31.56
FDR007 ENDING TIME OF FULL VOL SWAP -- 16.31.56 -- UNIT=3390-3 ,IN=D#DATA22,OUTPUT=TAPE1 16.31.56
FDR122 OPERATION STATISTICS FOR 3390 VOLUME.................DATA22 16.31.56
FDR122 CYLINDERS ON VOLUME.............3,339
FDR122 DATASETS PROCESSED..............234
FDR122 BYTES READ FROM DASD.......237,893,477
FDR122 DASD TRACKS SWAPPED.............4,986
FDR122 UPDATED TRACKS RECOPIED.........2,639
FDR122 DASD EXCPS......................381
FDR122 TARGET DASD EXCPS...............450
FDR122 CPU TIME (SECONDS)..............0.522
FDR122 ELAPSED TIME (MINUTES)..........2.5
FDR122 SWAP TIME.......................2.5
FDR999 FDR SUCCESSFULLY COMPLETED 16.31.56
```

***Important***

*Before running SWAP operations with FDRPAS, you are strongly advised to review the checklist in section 300.01 of the FDRPAS manual.*

*You should also check the FDRPAS web-site http://www.innovationdp.fdr.com/ftp_fdrpas.cfm for the latest information on IBM APAR's and PTF's that need to be applied before running FDRPAS.*

# FDRPAS

## Initiating FDRPAS SWAPs—Using PASPROC

As an alternative to running a batch job, FDRPAS SWAPs can also be initiated via the PASPROC cataloged procedure and the MVS START (S) console command. These SWAPs will run as system started tasks instead of jobs. For more information on this method of initiating FDRPAS SWAPs, see section 310 of the Product Manual.

## FDRPAS ISPF Interface

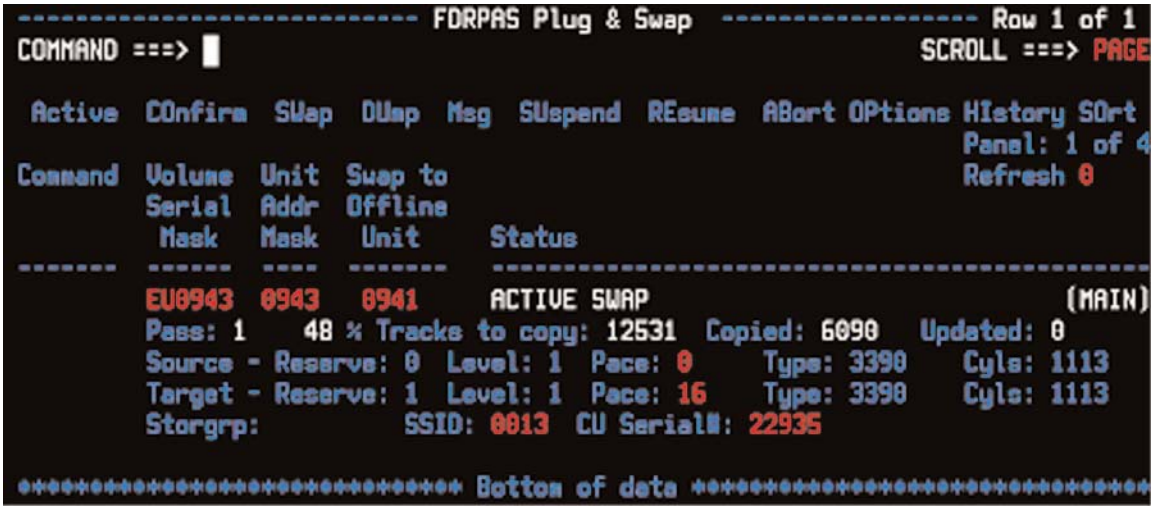
The third and final way of initiating FDRPAS SWAPs is via the FDRPAS ISPF interface, which allows for the initiation, monitoring and control of FDRPAS operations on the system to which your TSO session is logged on. Through the interface, you can:

- Initiate and monitor SWAP (and SWAPDUMP) tasks
- Suspend, resume, terminate tasks and amend pacing values
- Reply to FDRPAS console messages
- Display FDRPAS history records

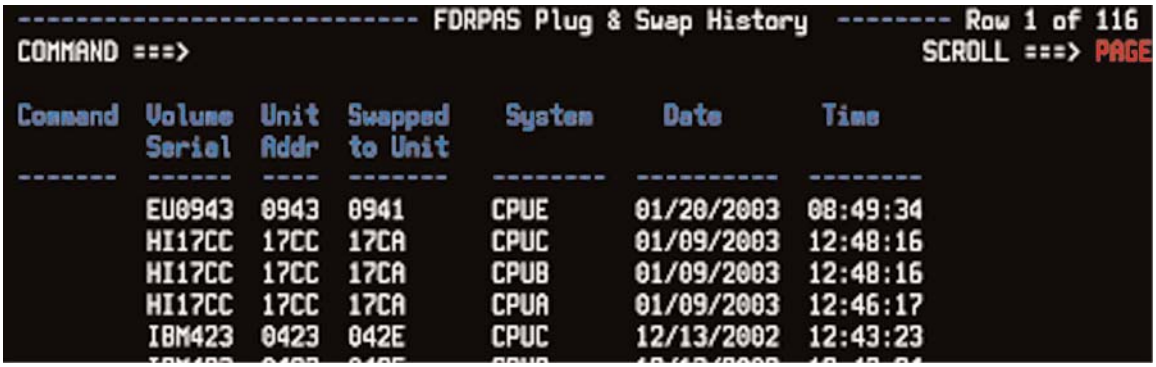
This first example shows the basic display showing a SWAP in progress. As you can see, the SWAP from unit address 0943 to 0941 is currently 11% completed.

## FDRPAS

If required, a more detailed display of the SWAP can be obtained:




And FDRPAS retains history records of the SWAPs it has completed. The following display has extracted some of that information. This type of history report can also be produced by running a report in batch:



# FDRPAS

## FDRPAS SWAPBUILDIX Utility

Independent of SWAP operations, FDRPAS also includes a utility function (SWAPBUILDIX) which allows you to build an indexed VTOC (VTOCIX) or rebuild a disabled VTOCIX on a shared DASD volume *while it is online to multiple systems*. The SWAPBUILDIX function uses FDRPAS communication and co-ordination techniques to allow the VTOCIX to be built while online to all sharing systems.

In the example shown below, the disabled Indexed VTOC will be rebuilt on DATA23. FDRPAS will determine the number of systems which have access to this volume (*i.e*. the volume is attached to a 3990-6 control unit or compatible disk subsystem). Prior to running this job, you must start FDRPAS monitor tasks on each of the systems, to monitor the offline monitor device specified by SWAPUNIT= (see second example below). The monitor device must be offline on all systems.

*FDRPAS—SWAPBUILDIX Example*

```
//BUILDIX   EXEC PGM=FDRPAS,REGION=0M
//STEPLIB    DD  DISP=SHR,DSN=fdrpas.loadlib
//SYSPRINT   DD  SYSOUT=*
//SYSUDUMP   DD  SYSOUT=*
    SWAPBUILDIX TYPE=FULL
    MOUNT  VOL=DATA23,SWAPUNIT=07C3
```

The following JCL example shows the monitoring of offline device 07C3 for SWAPBUILDIX operations. FDRPAS will periodically check this device to see if a FDRPAS SWAPBUILDIX task has started on another system. If so, the monitor task will wait for the VTOCIX to be rebuilt and then update the VTOCIX information on this system. Since this type of monitor task will continue to look for SWAPBUILDIX operations until terminated, you will probably want to use the DURATION= operand to automatically terminate it when it has been idle for a number of minutes. Alternately, you can cancel it when you are done.

*FDRPAS—Monitor SWAPBUILDIX Example*

```
//MONITOR  EXEC PASPROC
//SYSIN     DD  *
    MONITORTYPE=SWAP,DURATION=10
    MOUNT  SWAPUNIT=07C3
```

# FDRPAS

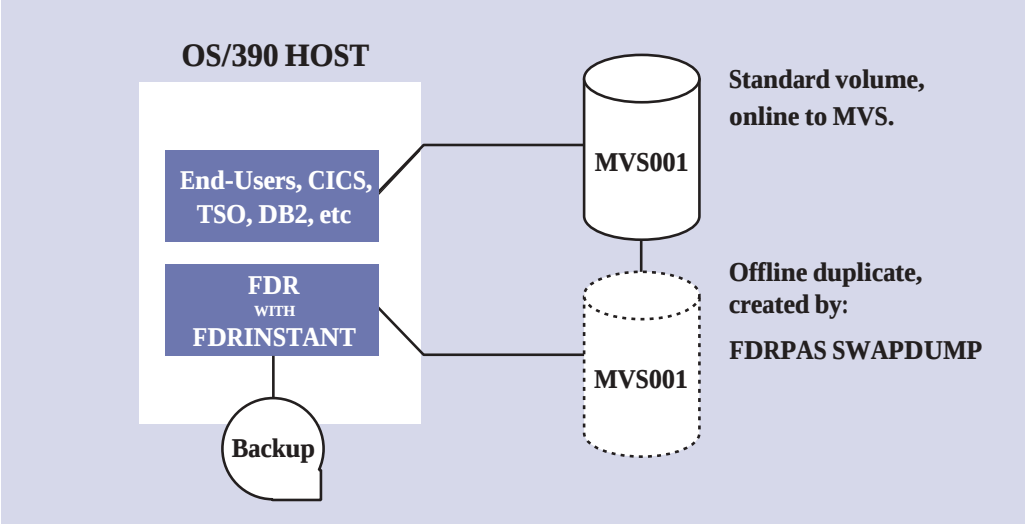
## Point-In-Time Backups with FDRPAS

We mentioned earlier that FDRPAS can also be used to create non-disruptive, point-in-time backups of disk volumes with FDR and FDRINSTANT.

- The FDRPAS SWAPDUMP command can be used to start constantly updated images of one or more disk volumes, at some time before the backups are required.
- A single command to FDRPAS (CONFIRMSPLIT) is then used to terminate the SWAPDUMP operation and create offline point-in-time images of those volumes.
- FDR and FDRINSTANT (separate features of the FDR DASD Management Family), can then be used to backup those offline images.

The diagram below summarizes the operation of point-in-time backups using the combination of FDRPAS and FDRINSTANT.

An offline duplicate of MVS001 has been created using the FDRPAS SWAPDUMP command. Then, while End-Users (and CICS, TSO, DB2, etc) continue to use the original online volume, the offline duplicate is backed up to tape with a standard FDR full-volume backup driven by FDRINSTANT:



## FDRPAS

The job below is an example of the process. A volume accessible by a single system image will be copied to an offline device. As soon as FDRPAS finishes synchronizing the volumes, the target device will become a frozen image of the source volume. The second step uses FDR and FDRINSTANT to backup that point-in-time image.

*FDRPAS—Point-In-Time backup Example #1*

```
//SWAPDUMP EXEC PGM=FDRPAS,REGION=0M
//STEPLIB   DD  DISP=SHR,DSN=fdrpas.loadlib
//SYSPRINT  DD  SYSOUT=*
//SYSUDUMP  DD  SYSOUT=*
//SYSIN     DD  *
    SWAPDUMP    TYPE=FULL
    MOUNT   VOL=DATA22,SWAPUNIT=07C3
//BACKUP   EXEC PGM=FDR,REGION=0M,COND=(0,NE,SWAPDUMP)
//SYSPRINT  DD  SYSOUT=*
//DISK1     DD  DSN=FDR.USE.UNIT07C3,UNIT=SYSALLDA,
//          VOL=SER=DATA22,DISP=OLD
//TAPE1     DD  DSN=BACKUP.VDATA22,UNIT=TAPE,DISP=(,CATLG)
//SYSIN     DD  *
    DUMP    TYPE=FDR
```

In the example below (this time using the PASPROC cataloged procedure via a START (S) command on the console), several volumes which are accessible to 3 system images will be copied to offline devices. Prior to running this job, an FDRPAS monitor task must be started on each of the systems to monitor the target devices.

*FDRPAS—PASPROC Monitor Example*

```
S PASPROC.PROD01,PARM='SWAPDUMP TYPE=FULL,CO=YES/MOUNT VOL=PROD01,SU=1B32'
S PASPROC.PROD02,PARM='SWAPDUMP TYPE=FULL,CO=YES/MOUNT VOL=PROD02,SU=1B34'
S PASPROC.PROD03,PARM='SWAPDUMP TYPE=FULL,CO=YES/MOUNT VOL=PROD03,SU=1B37'
```

*Notes: "CO=" and "SU=" are abbreviations for CONFIRMSPLIT= and SWAPUNIT=, to reduce the length of the console input. CONFIRMSPLIT=YES causes FDRPAS to wait for confirmation before freezing the point-in-time image. This can be done using the FDRPAS ISPF panels, or by using a MONITOR TYPE=CONFIRMSPLIT batch job. CONFIRMSPLIT=YES does not involve a WTOR to the console operator. Once the SWAPDUMP operations have been confirmed, FDRINSTANT can then be used to backup those frozen images to tape.*

# FDRPAS

## Summary

In today's data centers, where 24 x 7 operations are now often a *need* rather than a luxury, the ability to move data around the DASD subsystem with the minimum of disruption has become a priority for most DASD Administrators.

Whether it is a single DASD volume being moved to alleviate I/O bottlenecks, or perhaps a full range of devices being migrated across to newly installed hardware, the DASD Administrator needs to get the job done quickly and effectively, and with the minimum of disruption to his End-users and their application systems.

FDRPAS provides DASD Administrators with a simple yet effective tool for non-disruptively moving data around the DASD subsystem. If required, a single batch job can be used to move literally terabytes of data. The whole process can be monitored through the ISPF panels and the completion of each volume swap can be recorded and viewed in the History logs.

Simple, effective, fast, reliable. **FDRPAS**.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March 2003